

The opinion in support of the decision being entered today was *not* written for publication and is *not* binding precedent of the Board.

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte CINDY THERESA CORNELIA CUYPERS
and DAVID IAN STANBRIDGE

Appeal 2006-1972
Application 09/831,001
Technology Center 1700

Decided: SEPTEMBER 15, 2006

Before KIMLIN, GARRIS, and WARREN, *Administrative Patent Judges*.

WARREN, *Administrative Patent Judge*.

DECISION ON APPEAL

This is an appeal under 35 U.S.C. § 134 from the decision of the Examiner finally rejecting claims 13 through 24 and 27 through 34, all of the claims in the application.

Claim 13 illustrates Appellants' invention of a device for treating a gas/liquid mixture, and is representative of the claims on appeal:

13. A device for treating a gas/liquid mixture, comprising
 - a) a substantially vertical tube having an inlet opening for the mixture and an outlet for the mixture located downstream;

- b) rotating means arranged in the tube for setting the mixture into rotating movement;
- c) one or more outlet openings arranged downstream relative to the rotating means for allowing a separated part of the mixture to flow laterally out of the tube;
- d) a return conduit arranged centrally in an axial direction through the rotating means for reintroducing the flow which has exited via the outlet openings, and including a divergence element at an end part of the return conduit for causing the reintroduced flow to diverge substantially laterally outward from the return conduit and substantially prevent liquid creep flow along the rotating means; and
- e) an axial obstruction in the reintroduced flow path for inducing the reintroduced flow in the divergence element to diverge substantially laterally outward from the divergence element;

wherein a flow path of the mixture comprises moving up the tube, out the one or more openings, and reintroducing the flow through the return conduit with the flow diverging substantially laterally outward from the return conduit.

The references relied on by the Examiner are:

Hodgson	4,187,089	Feb. 5, 1980
Karlsson	WO 93/05339	Mar. 18, 1993
(published World Intellectual Property Organization Application)		
Swanborn	WO 97/49477	Dec. 31, 1997
(published World Intellectual Property Organization Application)		

The Examiner has rejected claims 13 through 21 and 27 through 34 under 35 U.S.C. § 103(a) as being unpatentable over Swanborn in view of Hodgson (Answer 3-5), and claims 22 through 24 under 35 U.S.C. § 103(a) as being unpatentable over Karlsson in view of Hodgson as in claim 13 and further in view of Swanborn (*id.* 6).

We reverse.

We refer to the Answer and to the Brief and Reply Brief for a complete exposition of the positions advanced by the Examiner and Appellants.

OPINION

The dispositive issue in this appeal is whether one of ordinary skill in this art would have combined Karlsson and Hodgson and thus, replace creep flow interrupter **7** at the top of internal channel **6**, which extends from channel **12** through the swirling flow body **4** that affects the gas-liquid mixture in flow space **3**, of the vertical tube, cyclone type gas-liquid separator disclosed in Karlsson FIGs. **1** and **2** (Karlsson, e.g., 1:21-25, 2:5-13 and 31-33, 3:16, to 4: 25), with baffle **44** supported by axially extending circumferential rib members **46** to pipe **38**, which is in communication with spiral vane **20** through pipes **24,36** that are separated by drain orifices, in the sole gas-liquid mixture conduit of the horizontal vapor-liquid separator of Hodgson Figs. **1** and **2** (Hodgson, e.g., col. 1, ll. 34-57, col. 2, ll. 51-59, and col. 3, ll. 17-35). There is no dispute that Karlsson's apparatus modified in this manner satisfies the limitations "a divergence element at an end part of the return conduit for causing the reintroduced flow to diverge substantially laterally outward from the return conduit and substantially prevent liquid creep flow along the rotating means" combined with "an axial obstruction in the reintroduced flow path for inducing the reintroduced flow in the divergence element to diverge substantially laterally outward from the divergence element" specified in clauses d) and e) of claim 13.

The Examiner submits that creep flow interrupter **7** is a divergent element in the return conduit **6** as claimed but is not an axial obstruction in the return flow line as claimed, contending that “Hodgson teaches an axial flow obstruction (44) in a flow line that carries liquid drops in a gas stream . . . [and] provide[s] a substantially diverging flow from the divergence element with the lateral slots formed between the baffles [sic, ribs] 46” (Answer 3). The Examiner determines that the modification would “have the axial conical obstruction to have the gases impinge the obstruction so as to coalesce the liquid droplets in the gas stream, thereby effectively removing the final traces of liquid from the gas stream as taught by Hodgson (see col 1 lines 45-50)” (*id.* 3-4).

Appellants submit that Karlsson employs creep flow interrupter **7** to “physically deflect liquid creep flow on the outer surface of flow [body] (4) outward into flow space (3)” and has no affect on the return flow through channels **12** and **6** which pass vertically through the unobstructed axial opening at the top of channel **6**, arguing that creep flow interrupter **7** is not a divergence element as specified in claim 1, clause d) (Br. 13-15).

Appellants further submit that Hodgson’s horizontal vapor-liquid separator differs structurally and operationally from Karlsson’s vertical tube, cyclone type gas-liquid separator, pointing out that the former using “horizontal baffle structure (44,46) for the express purpose of reversing fluid flow in horizontal pipe (24) and allow any liquid droplets impinging on baffle (44) to coalesce and fall to the bottom” of the apparatus which has “no recycle or return conduit . . . disposed in main conduit or pipe (24)” (*id.* 15-17). Thus, Appellants argue that there is no motivation, other than their specification,

to combine the references in the manner applied, contending that if one of ordinary skill in the art were to combine the references, the result would be adding the baffle structure 44, 46 of Hodgson to the outlet opening 8 downstream of flow body 4 of Karlsson's apparatus (*id.* 16-18).

In response, the Examiner contends that Karlsson would have taught “the device as claimed, except for a modification on the tip (7, figure 1 or 17-figure 2, the flared end of the conduit) of the return (recycle) conduit (12);” “[t]he structure corresponding to the [claimed] axial obstruction is an inverted cone at the tip of the tube as depicted in Appellant's figure 3, part 10; the slots around the conduit at (10) providing diverging flow path;” and “Hodgson teaches similar structure for a gas-liquid separator . . . to coalesce any remaining droplets in the gas stream” (Answer 6-7). The Examiner argues that “creep flow is already addressed by [Karlsson] by providing a diverging element” and the proposed modification “would inherently have the effect of blowing off the creep flow by the diverging return (recycle) flow” (*id.* 7-9).

Appellants reply that the there is no basis in Karlsson and Hodgson to support a finding that the proposed modification would inherently affect liquid creep in Karlsson's apparatus, and thus, the Examiner's position is predicated on Appellants' disclosure (Reply Br. 3-4).

We find that Karlsson would have disclosed that the creep flow interrupter 7 can be in the form of a truncated cone or a substantially flat dish as illustrated in Karlsson FIGs. 1 and 2, both of which deflect flow from flow element 4 into flow space 3 and do not obstruct in any manner the axial flow of the return flow liquid-air mixture through internal channel 6,

as Appellants argue. Thus, we find that contrary to the Examiner's position, creep flow interrupter 7 does not satisfy the limitation of clause d) of claim 1 for the reason that it does not cause "the reintroduced flow to diverge substantially laterally outward from the return conduit and substantially prevent liquid creep flow along the rotating means."

Therefore, in order to arrive at the claimed apparatus encompassed by appealed claim 1, one of ordinary skill in this art would have had to replace creep flow interrupter 7 and its function of physically deflecting outward the liquid and gas-liquid mixture flow in flow space 3 propelled by swirling flow body 4, by a structure which has a divergence element and an axial obstruction as claimed which deflects the gas-liquid mixture return flow in internal channel 6 outward into flow space 3, the relatively low pressure at the outlet of internal channel 6 causing the return flow mixture to be "drawn in by the main flow" in flow space 3 (Karlsson 4:5-8).

We agree with the Examiner that the structure of baffle and ribs **44,46** of Hodgson positioned on internal channel **6** of Karlsson would satisfy the claim limitations as indeed, it resembles the structure of conical element **17** and slots **19** positioned on recycle conduit **16** of specification **FIG. 2** (specification 4:3-8). However, it is well settled that "[t]he mere fact that the prior art may be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art suggested the desirability of the modification." *In re Fritch*, 972 F.2d 1260, 1266, 23 USPQ2d 1784, 1784-85 (Fed. Cir. 1992); *In re Gordon*, 733 F.2d 900, 902, 221 USPQ 1125, 1127 (Fed. Cir. 1984).

We fail to find substantial evidence in the teachings of Karlsson and of Hodgson which would have suggested to one of ordinary skill in this art that the references should be combined with the resulting modification of the Karlsson apparatus with the baffle and ribs of Hodgson. *See generally, In re Kahn*, 441 F.3d 977, 985-89, 78 USPQ2d 1329, 1334-38 (Fed. Cir. 2006). Indeed, as Appellants point out, and the Examiner does not disagree, there is no teachings in the references to make the modification based on liquid creep interruption. We agree with Appellants that the difficulty with the Examiner's theory of droplet coalescence is that there is also no teachings in Karlsson which would have suggested to this person that the purpose of the liquid-air mixture return flow pulled along in channel **12** and internal channel **6** by pressure in flow space **3**, is droplet coalescence in the channels, and indeed, the channels are not fitted with drains and there is no disclosure that the liquid merely runs down the channels. In contrast, the liquid gas mixture is propelled in the sole gas-liquid mixture conduit of the horizontal vapor-liquid separator of Hodgson **Figs. 1 and 2** by spiral vane **20** in order to drive the separated liquid through drain orifices with the mixture of air and remaining liquid impinging baffle **44** to coalesce the remaining droplets which drains between ribs **46**.

Accordingly, in the absence of a *prima facie* case of obviousness established over the teachings of Karlsson and Hodgson, we reverse the ground of rejection of claims 13 through 21 and 27 through 34 under 35 U.S.C. § 103(a). For the same reasons, the Examiner has failed to establish a *prima facie* case of obviousness over the teachings of Karlsson,

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Hodgson, and Swanborn and thus, we reverse the ground of rejection of claims 22 through 24 under 35 U.S.C. § 103(a).

The Examiner's decision is reversed.

REVERSED

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